1745 AF

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re of Appellant	)	
Migaku Takahashi	)	Art Group: 1745
Serial No.: 09/268,948	)	
Filing Date: March 16, 1999	)	Examiner: Cantelmo, Gregg
Title: IRON NITRIDE FILM HAVING A NITROGEN MARTENSITE OF PHASE WITH α (200) SURFACE	)	

APPEAL BRIEF

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HON. COMMISSIONER FOR PATENTS
PO Box 1450
Alexandria, VA 22313-1450

Sir:

Appellant hereby submits the instant Appeal Brief in support of the Notice of Appeal from the Examiner to the Board of Patent Appeals and Interferences involving an appeal from the decision of the Examiner dated May 29, 2003, finally rejecting claims 1, 10, and 12.

REAL PARTY IN INTEREST

The real party in interest of the above-captioned matter is Migaku Takahashi.

RELATED APPEALS AND INTERFERENCES

None.

STATUS OF CLAIMS

Claims 1, 2, and 10-13 are pending; and claims 3-9 have been canceled in this application. Claims 1, 10, and 12 are finally rejected; and claims 2, 11, and 13 are allowed in this application. Finally rejected claims 1, 10, and 12 are subject to appeal.

STATUS OF AMENDMENTS

No amendment to any of the claims has been submitted subsequent to the final rejection.

SUMMARY OF INVENTION

A magnetic thin film (Figs. 3, 4) includes an iron nitride thin film having a nitrogen martensite α' phase with α (002) surface formed on a substrate (page 6, last paragraph - page 7, third paragraph). The iron nitride thin film is produced on the substrate in a manner so as to permit defraction rays from a γ' phase to be observed. The α' phase has defraction rays observed from only the α (002) surface (paragraph bridging pp. 9-10).

ISSUES

1. Whether claims 1, 10, and 12 are anticipated under 35 U.S.C. § 102 (b) by "Synthesis of $Fe_{16}N_2$ films by using reactive plasma" (Takahashi et al).

GROUPING OF CLAIMS

Appellant submits that claims 1, 10, and 12 stand or fall together.

SUMMARY OF ARGUMENTS

I. Takahashi et al does not disclose or suggest the general co-existence of α' and γ' phases in an iron nitride film.

II. The contention of the Examiner that the process conditions for sputtering the iron nitride in the instant application and in the Takahashi et al reference are identical and therefore that the prior art iron nitride film of Takahashi et al will inherently have a co-existence of the α' and γ' phases is improper.

ARGUMENT

For purposes herein, unless otherwise noted, all references to statements and rejections made by the Examiner refer to the Final Office Action dated November 15, 2002 (Paper No. 24) in the above-captioned matter.

I. Takahashi et al does not disclose or suggest the general co-existence of α' and γ' phases in an iron nitride film.

Claim 1 recites in part:

> said iron nitride thin film being produced on the substrate in a manner to as to permit diffraction rays from a γ phase to be observed,

said α′ phase having diffraction rays observed from only said α (002) surface.

Appellant submits that such an invention is neither taught, disclosed nor suggested by Takahashi et al or any of the other cited references, alone or in combination.

Takahashi et al, at page 3043, discloses the appearance of a γ′ phase. Takahashi et al discloses a phase change of $Fe_{16}N_2$ films occurs around 250°C which causes (α″ + α′) to change to (α + γ′) (as further illustrated in Fig. 3(b)). As such, Takahashi et al does not disclose or suggest the general co-existence of the α′ and γ′ phases. Based upon that phase change information, one of ordinary skill in the art would expect α′ and γ′ to coexist, under equilibrium conditions, only at 250°C within the thin films disclosed by Takahashi et al. Further, Takahashi et al does not disclose or suggest any other conditions (either equilibrium or non-equilibrium) under which α′ and γ′ can occur together. Thus, Takahashi et al fails to teach or suggest the present invention, as set forth by claim 1.

II. The contention of the Examiner that the process conditions for sputtering the iron nitride in the instant application and in the Takahashi et al reference are identical and therefore that the prior art iron nitride film of Takahashi et al will inherently have a co-existence of the α′ and γ′ phases is improper.

It is not necessarily inherent that the iron nitride film of Takahashi et al will have a co-existence of the α′ and γ′ phases.

"To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.'" *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999)

"In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis in original)

The Examiner contends that the prior art reference (Takahashi et al) appears to form an iron nitride film under the same sputtering conditions set forth in the present invention, and therefore it is necessarily inherent that the iron nitride film of Takahashi et al will inherently have co-existing α′ and γ′ phases. However, for a characteristic (i.e., the co-existence of α′ and γ′

phases) to be inherent from the teaching of Takahashi et al, it must necessarily flow from the teachings of that reference. That is to say, the process conditions for sputtering the iron nitride in the present invention and in the Takahashi et al reference must in fact be identical. Yet, a close examination of both the reference and the present specification indicates that the process conditions for sputtering of the respective iron nitride films is indeed not identical. Specifically, in a step preliminary to forming of an iron nitride film, in both the reference and the present specification an iron film is first formed as an underlayer. In Takahashi et al, such an iron film is formed by initially evaporating the iron by EB vacuum evaporation and also sputtering in an argon plasma (deposition rate of 33 Å per minute on MgO). In contradistinction, the present specification sets forth that such an iron base layer is formed in an argon atmosphere. One of ordinary skill in the art would recognize that an argon atmosphere, which is inert, is not the same as a highly charged argon plasma. The manner in which the iron base layer is formed can potentially affect the surface chemistry thereof, which in turn can potentially have an effect on the deposition of further layers on such an iron layer.

Another process parameter that is different between Takahashi et al and the present invention is the electron density Ne used

during film formation. In Takahashi et al the electron density Ne was about 10^9 cm^{-3}, while the electron density Ne of the present invention is preferably in a range of upwards of 10^{10} cm^{-3}. As such, the electron density for the present invention is potentially on the order of a factor of 10 higher than that used with respect to Takahashi et al. Placing this electron density differential in perspective, in Takahashi et al there were approximately one billion electrons present in a given cubic centimeter. Meanwhile, in the present invention, there can be approximately 10 billion electrons in a given cubic centimeter during iron nitride thin film formation.

Accordingly, the process parameters used in forming the iron nitride film of the present invention are not necessarily the same as those set forth for creating the iron nitride film in Takahashi et al. Given these differences in process parameters, which can be significant, the attempt to establish that the iron nitride thin film of Takahashi et al includes both an α' and γ' phase becomes based merely upon probabilities or possibilities. Furthermore, there is no basis in fact and/or technical reasoning to reasonably support the determination that the presence of both an α' phase and γ' phase necessarily flows from the teachings of Takahashi et al based upon the theory of inherency. In fact, Takahashi et al tends to teach away from their coexistence at temperatures other than

250°C. Thus, Takahashi et al fails to teach or suggest the present invention as set forth in claim 1.

For all the foregoing reasons, Appellants submit that claim 1, and claims 10 and 12 depending therefrom, are now in condition for allowance and hereby respectfully request that the rejection thereof based upon on Takahashi et al be withdrawn.

Further, a check in the amount of One Hundred and Sixty Dollars ($160.00) for the filing of this Appeal Brief is hereby submitted.

If the Examiner or Board has any questions or comments that would advance prosecution of this case, the Examiner or Board is invited to call the undersigned at 260/485-6001.

Respectfully submitted,

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RJK/mdc10

Encs: Appendix of Clean Claims
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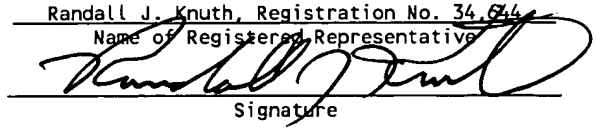
CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, PO Box 1450, Alexandria, VA 22313-1450, on: July 16, 2003.

Randall J. Knuth, Registration No. 34,644
Name of Registered Representative



Signature

July 16, 2003
Date

APPENDIX OF CLAIMS UNDER APPEAL

1. A magnetic thin film comprising:

an iron nitride thin film having a nitrogen martensite α' phase with α (002) surface formed on a substrate, said iron nitride thin film being produced on the substrate in a manner so as to permit diffraction rays from a γ' phase to be observed, said α' phase having diffraction rays observed from only said α (002) surface.

10. The magnetic thin film manufacturing method of claim 4 in which an electron voltage during the formation of the iron nitride thin film is within a range of 0.01 to 1 Ev, and an electron density is within a range of 1×10^{9} to 1×10^{10} cm^{-3}.

12. The magnetic thin film in accordance with Claim 1 wherein said iron nitride thin film is formed on an iron under layer on said substrate.